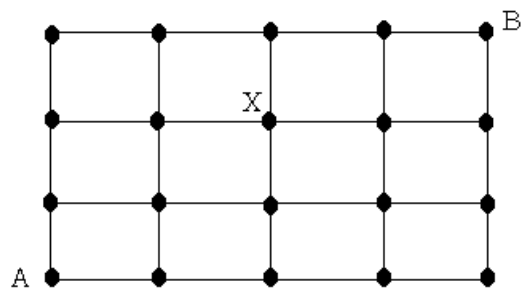


# Best Student Exam

1. Suppose a person is standing at the grid point  $A$  in the diagram below and they wish to move to the grid point  $B$ . The rules for moving in the grid require that the person move strictly along grid lines, and that their movement can only be up or to the right. What is the probability that the person will encounter the grid point  $X$  in their movement from  $A$  to  $B$ ?

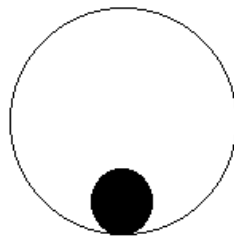


2. Does the equation

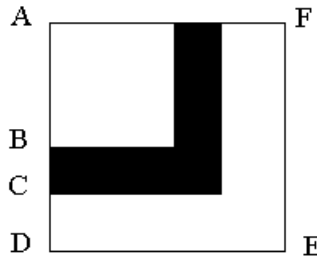
$$(x - 3y)(x + 3y) = 25$$

represent an ellipse, a parabola, a circle, a hyperbola or two lines?

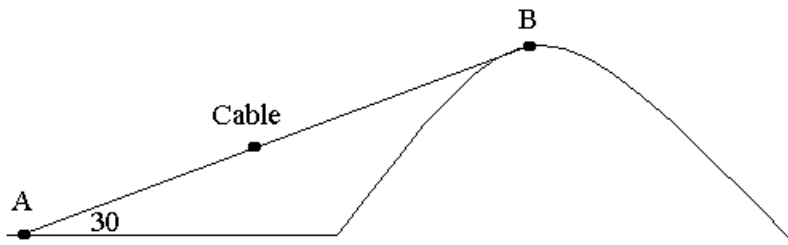
3. A total of 28 handshakes were exchanged at the end of a party. Assuming that all participants were completely polite toward one another, how many people were at the party?
4. The figure shown below shows a fixed circular track of radius 3 ft and a wheel of radius 1 ft. How many revolutions are required to roll the wheel around the inside of the track?



5. Suppose  $ABCD$  is a rectangle and  $P$  is a point inside the rectangle. The lengths of  $PA$ ,  $PB$ ,  $PC$  are 4, 3,  $\sqrt{10}$  respectively. What is the length of  $PD$ ?
6. The Smith sisters make the following statements. If Vera told the truth, who else must have told the truth?
- Lucy: "If the rug is in the car, then it is not in the garage."  
 Sally: "If the rug is not in the car, then it is in the garage."  
 Vera: "If the rug is in the garage, then it is in the car."  
 Cherry: "If the rug is not in the car, then it is not in the garage."
7. Three squares whose side lengths are integers are placed overlapping as shown below. If  $BC=CD$  and the shaded area is 31, determine the area of the square  $ADEF$ .



8. The ride on the cable car from station A at ground level to station B at the top of Mt. Glacier takes 16 minutes. The average speed of the cable car is 2 meters per second and it moves in a straight line forming a  $30^\circ$  angle with the horizontal. Find the height of Mt. Glacier in meters (measured from the level of station A).



9. Let  $L$  be the line  $x + 2y = 6$  and  $T$  be the line  $4y = 12x - 9$ . Find the line  $K$  as pictured below. Write your answer in the form  $ax + by = c$  where  $a$ ,  $b$  and  $c$  are relatively prime integers and  $a > 0$ .

